offence, the latter disapproving of it entirely as a normal part of the curriculum. Others, again, incline to the view that actual new investigation, as opposed to ordinary laboratory work, is an extremely important and useful incident in training. On the other hand, there is no trace of difference of opinion as to whether or no it is not at once an imperative duty and an immense practical advantage for a university to provide every encouragement in the shape of equipment and scholarship or fellowship endowment for what may be called post-graduate research. In this respect the duties of a university are to be limited only by her resources.

The general result of this interesting discussion by experts is that an atmosphere of original investigation should pervade a university. Its professors must be investigators if only because otherwise they cannot be competent teachers. Its schools must be provided with the appliances and material facilities for research, and it must attach to itself by scholarships and fellowships numbers of young men devoting themselves, in the first place, to research; while the conduct of original investigation may be made an incident in the normal training of advanced students.

It is to be noticed that this emphatic pronouncement is based directly on experience, and on experience of a strictly pedagogic or university type. These experts in conference had no need to raise the underlying principles on which useful continuance of the existence of universities depends. Universities are organs of the community, and the pabulum that they absorb, whether it be derived from hoards of the past or from the circulating wealth of the present, obviously is diverted from other uses. Their utility depends upon the returns they make to the community. Such products consist of an output of trained men and of knowledge; these, to resume the metaphor, corresponding to the direct secretion of an organ, and the general diffusion of a subtle but pervading influence comparable with the internal secretions discovered by modern physiology. A university that starves and discourages research turns out into the world smooth and conventional graduates, blind to the surprising novelties of life, more ready to meet crises, small or great, with historical parallels than novel efforts; fitter to adorn success than to achieve it; it prefers criticism to knowledge, style to matter, glosses and reconciliations to the disconcerting energy of new ideas; it instils into the body politic a bland and slothful miasma of self-content. A university pervaded by the spirit of investigation sends out graduates ready to change with changing conditions, to whom difficulties are opportunities, and who, above all, are trained to watch for the inevitable changes in the most familiar ideas as new facts creep into light; it sends out the new knowledge, which becomes transmuted into new practical advantages for humanity, and it sends out the old knowledge not wrought into artificial harmonies, but with a bold presentation of the gaps and roughnesses which are the chief stimulus to new discovery; it radiates through the community the alert and adaptive spirit of progress.

It is needless to say that, like the American universities, the universities of the continent, and in especial those of Germany, are conspicuous for the extent to which they encourage research by their funds and by their arrangements. The historian of the future, who is to trace the vast progress made in recent years by Germany in power, wealth, commerce, the arts and industries, without doubt will notice the part played by her many universities in this momentous change. A single article in the pages of a scientific journal is not a suitable vehicle for any exact examination of the relative advances made by England and other countries in recent times. But, until matters have been put right, every opportunity is convenient to insist that the universities of Britain do not encourage research sufficiently, and that, in particular, her richest university habitually and systematically despises research in its general arrangements, in the allocation of its endowments, and in the distribution of its revenues. Moreover, it is especially unfortunate that not only is the amount of consideration given to research minute, but is diminishing.

A single example is more convincing than a multitude of general statements, and an appropriate instance lies unfortunately ready to hand in the preface to the last volume of "Linacre Reports," recently issued by Prof. Ray Lankester. The late Linacre Professor and present Keeper of the British Museum of Natural History, in a preface addressed to the Vice-Chancellor of the University of Oxford, deplores the attitude of the Oxford colleges to the natural sciences. "The College endowments," he states, and every one with knowledge of the matter is able to corroborate, "are now more largely than ever employed in maintaining a tutorial system, which is in itself of small value—if not positively injurious—and necessarily in complete antagonism to the development of the method of study, and to the wide range of subjects studied, which distinguish everywhere but in Oxford the University from the Preparatory School." Prof. Lankester believes that the natural sciences, the subjects particularly associated with research as a means of training and as a source of directive knowledge, should be supported by not less than two-thirds of the endowments at the disposal of these colleges. Oxford, no doubt, is an extreme example of the general failure of British universities to respond adequately to what everywhere but in England is regarded as the first duty of a university; but there is urgent need for inquiry into and redress of the conditions which have brought about the present state of affairs, and those institutions which have taken a larger view of their duties will be the first to approve a strong statement of the existing failure.

BRITISH DRAGONFLIES.[1]

MR. LUCAS is favourably known to entomologists by previous works on British Butterflies and British Hawk-moths; but in the present work he has broken new ground, and gives us a complete and trustworthy account of our British Dragonflies, the study of which has previously been much neglected in England.

Dragonflies resemble butterflies in being among the largest and most conspicuous of day-flying insects; but they are far less numerous in species, for while there are 300 butterflies in Europe in round numbers, out of which from 60 to 70 inhabit the British Islands, the Dragonflies of Europe barely exceed 100, of which, however, 40 are admitted by Mr. Lucas as British, a considerably larger proportion than in the Butterflies. It is curious, however, that among seven additional species, properly excluded by Mr. Lucas as not truly indigenous, is *Pantala flavescens*, Fabricius, said to have been taken years ago by Sparshall in the Fens. This is an abundant species in nearly all parts of the world (Asia, Africa, Oceania and America), but with the single exception above-mentioned, it has never been noticed as occurring in any part of Europe.

One advantage of dealing with a limited subject is that it permits of its being treated with sufficient fulness for most practical purposes, in a sufficiently portable form.

While not neglecting the literature of his subject, a large portion of the present volume is based on Mr. Lucas's own personal observations, which imparts much greater value to the whole of his work; for although every author must be more or less dependent on the observations of others as well as on his own, yet he is not

[1] "British Dragonflies" (Odonata). By W. J. Lucas, B.A., F.E.S. Illustrated with 27 Coloured Plates and 57 Black and White Engravings. Pp. xiv + 356. (London: L. Upcott Gill, 1900.)

competent to judge of them, or to estimate their relative value and importance, unless he himself has a practical as well as a theoretical acquaintance with the subject.

One disadvantage in collecting Dragonflies is the difficulty of preserving the colours of most of the species. Hence the importance of carefully coloured illustrations taken from fresh specimens; and although Mr. Lucas's illustrations, which appear to be colour-printed, are not equal to Charpentier's beautiful plates of the same insects, they represent the insects very well, and the neuration of the wings is also accurately reproduced. Photography would, however, be the only way in which the neuration of many of these insects could be produced with absolute accuracy, especially in the case of *Neurothemis* and one or two other East Indian genera, in which the network is excessively fine, and must include thousands of divisions in each wing.

Mr. Lucas has divided his work into nine chapters—introduction, life-history, classification, the nymph, the imago, genera and species, reputed species, breeding the nymph, and preparing for the cabinet. The book concludes with addenda and corrigenda, list of works referred to, and a good general index. There are also detailed tables of genera and species, and even of the nymphs. The plain figures represent oviposition, eggs, nymphs, parasites, and various details of the insects.

In order to show the full manner in which Mr. Lucas has dealt with his subject, we will take one of the best known, though not one of the very commonest species, *Libellula quadrimaculata*, Linn., to which nearly twelve pages are devoted. First we have synonymy, then the original description (which we would gladly see inserted, as a matter of course, in all descriptive works, whenever possible, as it would save much misunderstanding and inaccuracy), size, description of the male imago, the female, immature colouring, variation, oviposition, egg, nymph, emergence of imago, date, habits, migration and distribution within the British Isles. It might be suggested that notes on extra-British distribution, and when desirable, notes on allied non-British species, would have made the account of each species more complete.

L. quadrimaculata is the most remarkable of the European Dragonflies for its migratory habits, and if memory serves us, it has sometimes been observed migrating in company with butterflies, though whether pursuing them as prey, or whether both species were urged by some common impulse, may be a matter for investigation. Most Dragonflies, except the slender-bodied and delicately-formed Agrionidæ, are very strong on the wing, and many even of those which are not migratory in their habits are often met with a long way from water. But there is no doubt that many Dragonflies are habitually migratory, which may partly account for the wide distribution of other species besides *L. quadrimaculata*, which latter, it may be noted, is found throughout temperate Asia and North America, as well as in Europe. In Christmas Island, near Java, where three wide-ranging species of Dragonflies are found (one of them being the almost cosmopolitan *Pantala flavescens*, already referred to), they are never seen except when the wind is blowing from a certain direction, when they appear suddenly in swarms.

A century ago we had no systematic works on British insects at all, except Lewin's admirable book on British Butterflies, published in 1795; for even Marsham's pioneer book on Coleoptera, and Haworth's on Lepidoptera, did not begin to appear till the beginning of the present century. At present we have more or less complete works on several orders and families of insects; but there are still many large groups, including the great order Diptera, and a large portion of the orders Hymenoptera, Neuroptera, and some families of Homoptera, of which we have no adequate up-to-date monographs at all, at least in a separate form.

We congratulate Mr. Lucas on his having so successfully filled up one of these remaining gaps in our British entomological literature.

As a specimen of Mr. Lucas's style, we may quote his account of the habits of one of the commonest of the larger British Dragonflies, *Æschna cyanea*, Müller:

"Though sometimes seen flying over the water, where it is difficult to catch, this insect is oftener met with along hedgerows and lanes, where it sometimes for a long time flies backwards and forwards over a very restricted range. On such occasions, notwithstanding its rapid, powerful flight, it is usually possible, with careful watching, to make a capture. When once startled, however, it usually soars away out of sight, to return very possibly, however, to the same spot a little later. On one occasion, in Berkshire, I noticed an *Æ. cyanea* hawking along a hedge in this way, and presently saw it capture a butterfly (probably the Small Copper). After circling round it several times the Dragonfly secured its prey, and began wildly careering round as if rejoiced at its success. While thus engaged, a wing of the butterfly—or part of one—was let fall, and *cyanea* settled in the

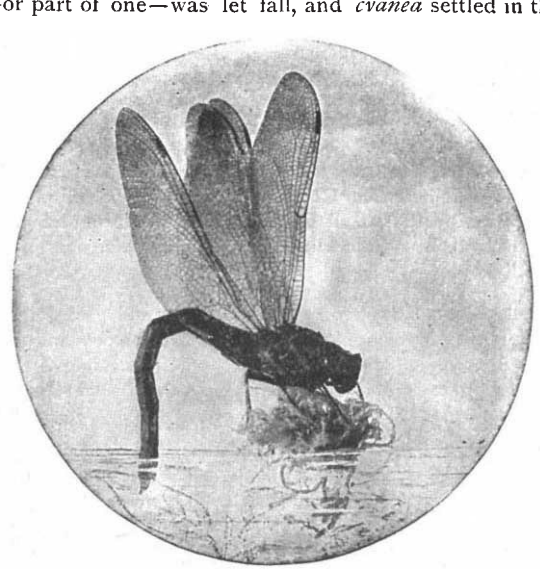

FIG. 1.—*Æschna grandis* ovipositing.

hedge, where it appeared to be further stripping its captive. Shortly after, the Dragonfly was captured in its turn, when the body of the butterfly was found still between its jaws. But it is, of course, not at all an uncommon thing for one of the larger Dragonflies to capture a butterfly, whose wings it removes in a very workmanlike manner."

Apropos of the above passage, we may remark that a large North American Dragonfly (*Anax longies*, Hagen), belonging to the same family as *Æschna cyanea*, is described as habitually *decapitating* its prey, which generally consists of some of the larger butterflies. W. F. K.

NOTES.

THE desire has been widely expressed in University circles in Edinburgh that the Curators of Patronage, with whom the appointment to the chair of medicine rests, should offer the post to Prof. Osler, of the Johns Hopkins University, who is well known as a teacher and clinicist of the highest scientific eminence, and whose acceptance of it would greatly strengthen both the systematic and clinical teaching in the University. It would appear, however, that the Curators have no choice in the matter, but are bound to advertise every vacancy, so that